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Ypsilorchis and Ypsilorchidinae, a new genus and a new subtribe of Orchidaceae

[1,3,4]Zhong-Jian LIU* [2,1,4]Sing-Chi CHEN [1,4]Li-Jun CHEN

[1](*The National Orchid Conservation Center,* Shenzhen 518114, China)
[2](*State Key Laboratory of Systematic and Evolutionary Botany, Institute of Botany, Chinese Academy of Sciences,* Beijing 100093, China)
[3](*College of Forestry, South China Agricultural University,* Guangzhou 510642, China)
[4](*The Orchid Conservation & Research Center of Shenzhen,* Shenzhen 518114, China)

Abstract A new orchid genus, *Ypsilorchis* Z. J. Liu, S. C. Chen & L. J. Chen, is established based on *Ypsilorchis fissipetala* (Finet) Z. J. Liu, S. C. Chen & L. J. Chen (basionym: *Liparis fissipetala* Finet). The new genus differs from *Liparis* and its allies by having two granular-waxy pollinia each with a somewhat elastic caudicle, deeply bilobed petals and strongly crisped-margined leaves with an apical awn to 1 mm long. These features are an indication of its distant relation to the members of the subtribe Liparidinae, and thus a new subtribe, Ypsilorchidinae Z. J. Liu, S. C. Chen & L. J. Chen, is proposed.

Key words new combination, new genus, new subtribe, Orchidaceae, taxonomy, Ypsilorchidinae Z. J. Liu, S. C. Chen & L. J. Chen, *Ypsilorchis* Z. J. Liu, S. C. Chen & L. J. Chen, *Ypsilorchis fissipetala* (Finet) Z. J. Liu, S. C. Chen & L. J. Chen.

Several years ago, when we began working on the Orchidaceae for the *Flora of China*, *Liparis fissipetala* Finet awakened our interest. It was a little known species described from northeastern Sichuan (now northern Chongqing) of China some a century ago (Finet, 1908). Although it was placed in *Liparis*, there are some remarkable characters, such as its deeply bilobed petals and strongly crisped-margined leaves, which we have not found in other members of *Liparis* Rich. Of course, it needs more materials, especially living plants, for a further study and evaluation. Unfortunately, no specimen has been collected since 1890s when P. Farges discovered it and sent the specimen to the Museum of Natural History in Paris (P).

Liparis is a large genus of about 250 species. It is widely distributed in both Old and New World, with the largest number found in Southeast Asia and New Guinea (Chen, 1999a). Four genera, namely *Liparis*, *Malaxis*, *Oberonia* and *Hippeophyllum*, constitute the subtribe Liparidinae (Chen, 1999a), which is characterized by having four waxy pollinia without both caudicle and viscidium. Although *Malaxis microtatantha* (Schltr.) T. Tang & F. T. Wang was reported having two pollinia (Tang & Wang, 1951), a recent observation revealed that it has four pollinia (Chen & Rao, 2007). However, the pollinarium structure of *Liparis fissipetala* has not been clear until recently. Although the type specimen was examined by S. C. Chen in 2002 when he visited Paris, it was difficult to clarify the pollinarium structure depending on a dry specimen.

Fortunately, during a recent botanical trip to Malipo county in Southeast Yunnan, some individuals of *Liparis fissipetala* were collected growing on a rock in forest in a limestone area. The present paper is a result of our studies in this interesting species based on fresh materials. It includes establishing a new subtribe and a new genus, as well as making a new combination of species.

1 Material and methods

The living plants of this species were found in Malipo (ca. 23º N) of Yunnan, China, in autumn of 2007. Six of them were brought back and cultivated in our nursery (Shenzhen), five of which soon flowered (November). In the type locality Chengkou (ca. 32º N), however, it flowered in September in the wild. The two localities of its growth are far away from each other, but their floral and leaf features are on the whole the same. Altogether ten fresh flowers, especially pollinaria, were minutely examined under stereoscope (Guiguang XTL-500, China), and their color photographs, black-white drawings and descriptions were all made in time.

In addition, the dominant trees and shrubs, as well as some herbs especially orchids, in its Malipo habitat were collected and identified. The fresh and

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* Author for correspondence. E-mail: <liuzj@sinicaorchid.org>.

dry pollinaria of this species and *Liparis assamica* King & Pantl. (*Z. J. Liu 3918*), a species more or less related to it, are examined for a critical comparison.

2 Results and taxonomic treatment

2.1 Morphological observation

A careful observation of the fresh materials shows that the vegetative and floral features are on the whole the same as being described and illustrated by Finet (1908), Seidenfaden (1976) and Chen (1999a). Of course, it is necessary to make an additional description of its lip and pollinaria.

Its lip is in fact composed of a basal claw, or hypochile, and an apical portion, or epichile. The claw is rather short, with a fleshy callus centrally. On both sides of the callus there are two lamellar appendages linking up with the auricles of the epichile. The epichile long-auriculate on both basal sides, centrally with a fleshy longitudinal band extending from its base to near the apex (Fig. 1: C, D; Fig. 2: B–D, G).

Liparis fissipetala has only two pollinia, each with a somewhat elastic caudicle, but there is no clear demarcation line between pollinium and caudicle. The pollinium looks waxy, but rather spongy and its surface is uneven. Although the end of the caudicle looks like sticky substance, it is not a true viscidium (Fig. 1: E–G; Fig. 2: H). *Liparis assamica* has four waxy pollinia (in two pairs), and lacks a distinct caudicle (Fig. 1: H). These features suggest that this entity is quite different from, or distantly related to, the other members of *Liparis*.

2.2 Taxonomic treatment

Ypsilorchidinae Z. J. Liu, S. C. Chen & L. J. Chen, subtrib. nov.

丫瓣兰亚族

Subtribus nova *Liparidinis* remote affinis, sed polliniis duobus granulari-ceraceis caudiculis leviter elasticis praeditis, petalis profunde bilobis ad apicem vel Y-formibus distinguibilis.

Typus subtribus: *Ypsilorchis* Z. J. Liu, S. C. Chen & L. J. Chen.

New subtribe is distantly related to the subtribe Liparidinae, from which it differs by having two granular-waxy pollinia each with a somewhat elastic caudicle, and deeply bilobed or Y-shaped petals.

Ypsilorchis Z. J. Liu, S. C. Chen & L. J. Chen, gen. nov.

丫瓣兰属

Genus novum insigne *Lipari* remote affine, a qua differt polliniis duobus granulari-ceraceis caudiculis leviter elasticis praeditis, petalis profunde bilobis ad apicem vel Y-formibus.

Typus generis: *Ypsilorchis fissipetala* (Finet) Z. J. Liu, S. C. Chen & L. J. Chen.

Pseudobulbs close, small. Leaves several, terminal and lateral, small, strongly crisped-margined, aristate apically. Inflorescence terminal, racemose, many-flowered; flowers small; lateral sepals connate forming a synsepal; petals deeply bilobed apically; lip auriculate and shortly clawed basally; column with two horn-like appendages on both upper sides, footless; pollinia two, granular-waxy, each with a somewhat elastic caudicle, without a true viscidium.

Ypsilorchis fissipetala (Finet) Z. J. Liu, S. C. Chen & L. J. Chen, comb. nov.——*Liparis fissipetala* Finet in Bull. Soc. Bot. France 55: 340, pl. 11 (1–12). 1908; Schltr. in Fedde Repert. Sp. Nov. Beih. 4: 197. 1919; S. Y. Hu in Quart. J. Taiwan Mus. 27 (3, 4): 420. 1974; Seidenf. in Dansk Bot. Ark. 31 (1): 86, fig. 57. 1976; S. C. Chen in Fl. Reip. Pop. Sin. 18: 102, fig. 18 (1–4). 1999.

丫瓣兰 Fig. 2

China. Chongqing (重庆): Chengkou (城口), *P. Farges 1553* (holotype, P!)

Epiphytic plants. Pseudobulbs ovoid, 8–10 mm long, 4–5 mm thick, with 3–4 leaves. Leaves terminal and lateral, oblanceolate to narrow-obovate, 8–16 mm long, 2–3.5 mm wide, strongly crisped-margined, apex with a distinct awn to 1 mm long, base shortly petioled and sheathing, articulated, deciduous in winter. Raceme terminal, 5–10 cm long, with 10–15 flowers; bracts ovate-lanceolate, 1.5–3.5 mm long; pedicel and ovary 4–5 mm long, glabrous; flowers yellow, 4–5 mm across; dorsal sepal oblong-lanceolate, 3–4 mm long, 0.8–1 mm wide, acute at apex, one-veined; lateral sepals connate from base to apical two thirds forming a suborbicular or ovate-orbicular synsepal 2.5–3 mm long and 2.5–3 mm wide; petals narrow linear, 4–5 mm long, apex deeply divaricate- or divergent-bilobed, Y-shaped; lobes 1.4–1.7 mm long; lip composed of a basal claw and an apical portion (epichile); epichile broadly oblong or subsquare, 1.5–2 mm long, 1–1.5 mm wide, base with 2 auricles on both sides, adaxially with a fleshy longitudinal band; claw short, with a fleshy callus centrally; callus linking up with the auricles by two lamellar appendages on its both sides; column erect, ca. 1.5 mm long, broadly winged in upper part, with two horn-like appendages on both upper sides, footless; stigma hollow; rostellum indistinct; pollinia 2, granular-waxy, narrow-pyriform, each with a somewhat

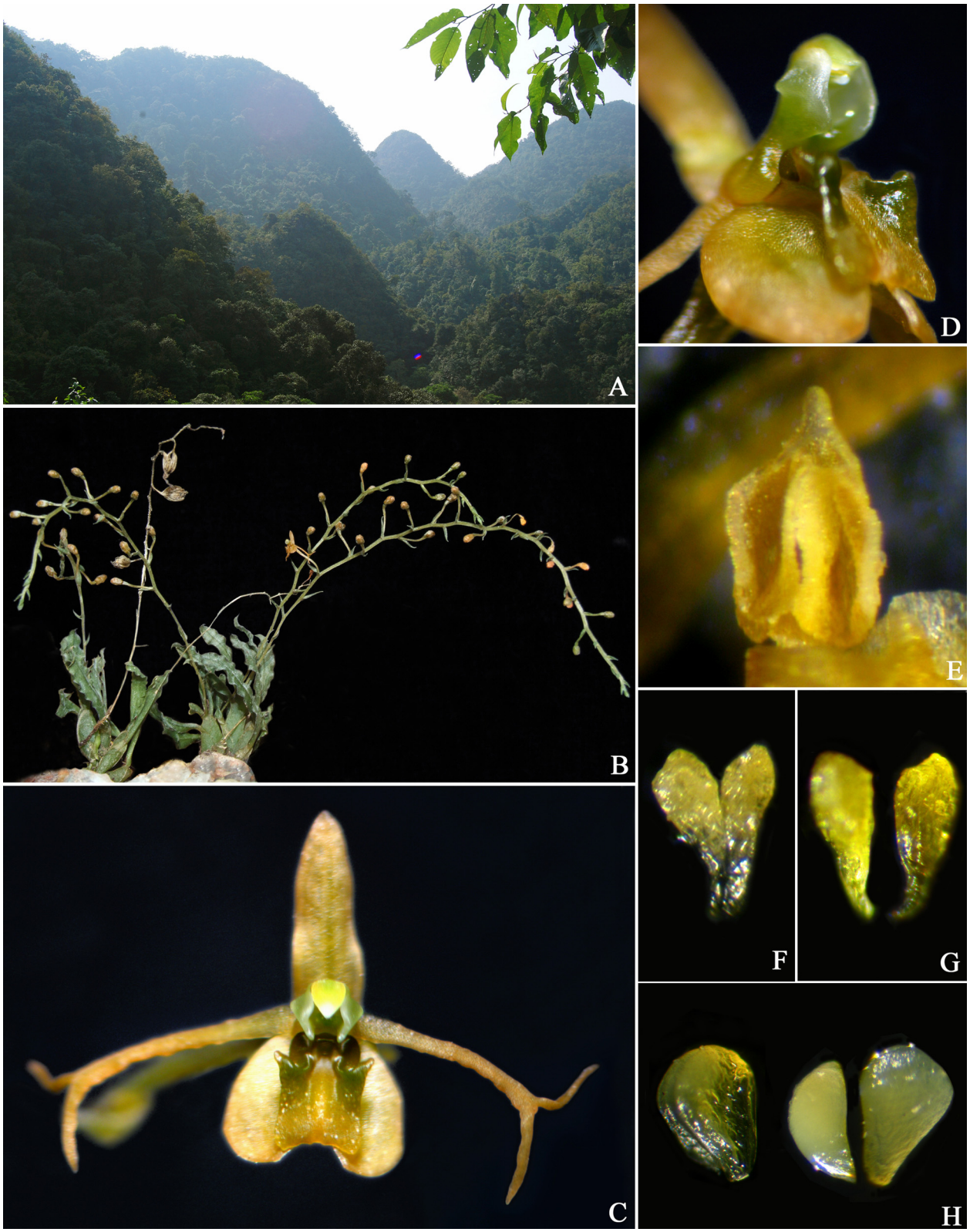

Fig. 1. **A–G,** *Ypsilorchis fissipetala* (Finet) Z. J. Liu, S. C. Chen & L. J. Chen. **A,** Habitat. **B,** Flowering plants. **C,** Flower, front view. **D,** Flower, side view. **E,** Anther cap. **F,** Pollinia from a fresh flower. **G,** Pollinia from a dry flower. **H,** *Liparis assamica* King & Pantl. Pollinia in 2 piars, from a fresh flower (*Z. J. Liu 3918,* collected from Malipo, NOCC). Left: a pair of close pollinia; right: a pair of separate pollinia.

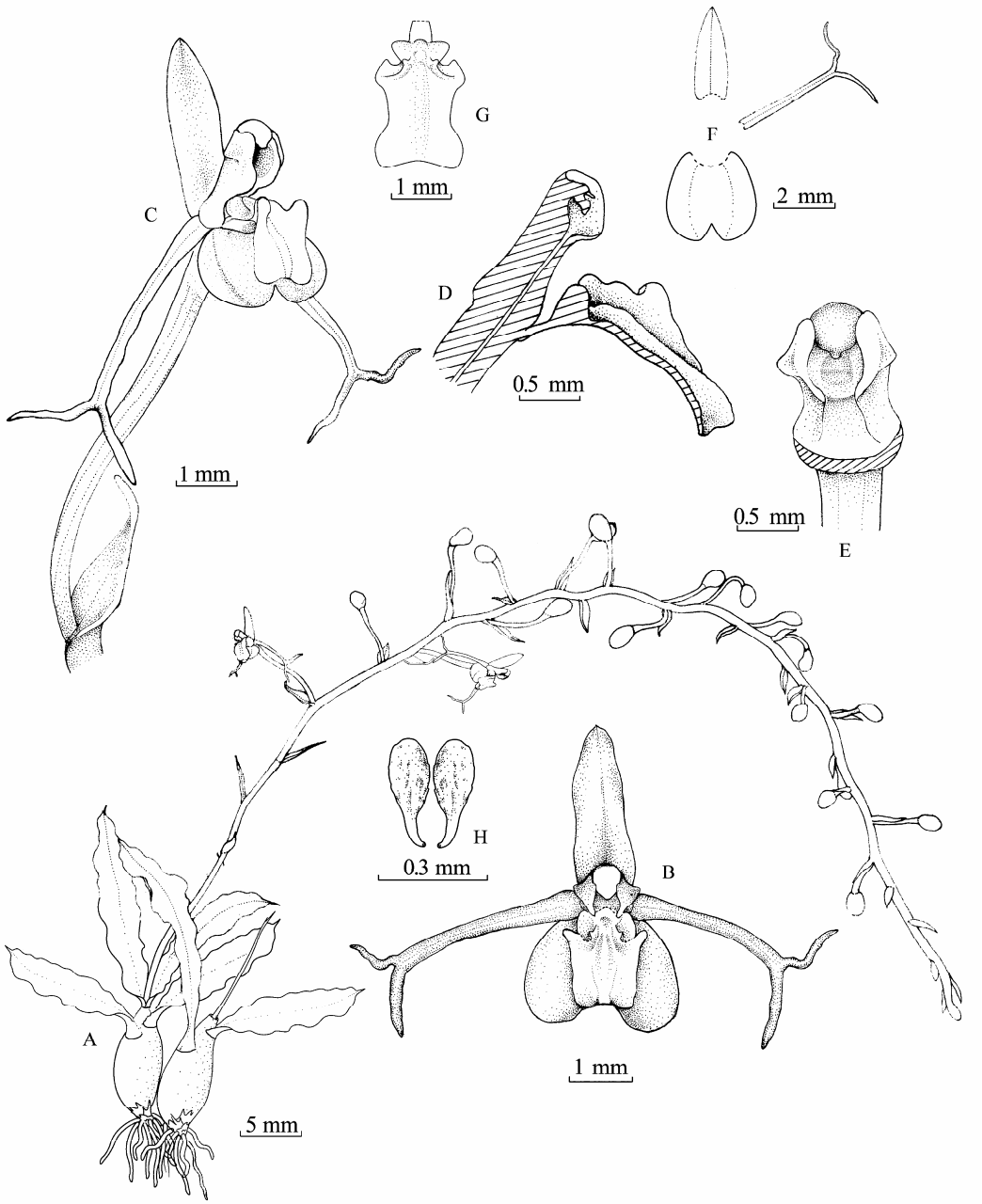

Fig. 2. *Ypsilorchis fissipetala* (Finet) Z. J. Liu, S. C. Chen & L. J. Chen. **A,** flowering plant; **B,** flower, front view; **C,** flower, side view; **D,** column and lip, longitudinal section; **E,** column, front view; **F,** dorsal sepal, petal and synsepal; **G,** lip; **H,** pollinaria. Drawn by X. H. Kong from *Z. J. Liu 3760*.

elastic caudicle, without a true viscidium.

Flowering period: September in the wild in Chengkou of North Chongqing, and November in cultivation in Shenzhen.

Distribution: China. North Chongqing (ca. 32º N) and Southeast Yunnan (ca. 23º N)(Fig. 3) .

Etymology: *Ypsilorchis* means "Y-shaped orchid", referring to the deeply bilobed or Y-shaped petals.

Specimens examined:

China. Chongqing (重庆): Chengkou (城口), P. Farges 1553 (holotype, P!). **Yunnan** (云南): Malipo (麻栗坡), Jinchangxiang (金厂乡) (23º7′ N,104º8′ E), 2007-11-05 (flowering in November in cultivation), alt. 1590 m, Z. J. Liu 3760 (NOCC*!).

*NOCC=Herbarium, the National Orchid Conservation Center, Shenzhen, China.

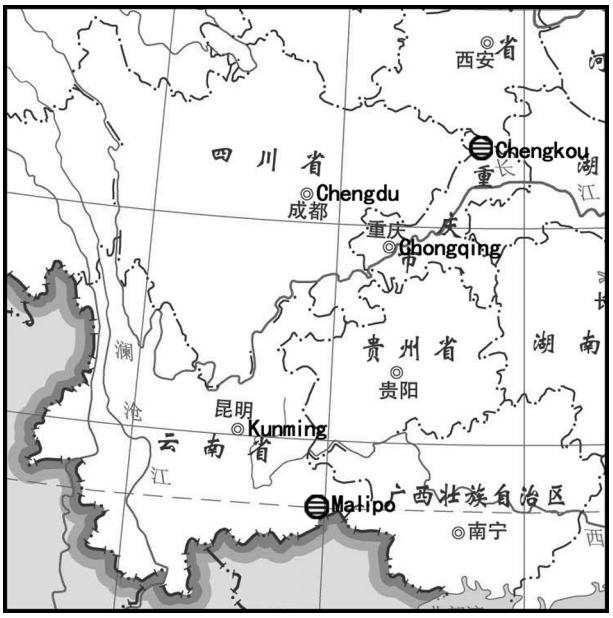

Fig. 3. *Ypsilorchis fissipetala* distributed in Chengkou of Chongqing and Malipo of Yunnan, China (The map from State Bureau Surveying and Mapping, China. www.sbsm. gov.cn/mcp/index.asp).

2.3 Ecological environment

The type locality of this species is in Chengkou of North Chongqing, where we failed to collect it again. The only information we have is that the species grew on trees in a forest at an elevation of 1200 m, and flowered in September (Finet, 1908).

In Malipo of Southeast Yunnan, however, the plants with flower buds were collected in early November of 2007. They flowered in our nursery a few days later. The plants were found growing on a slightly sunny rock in an evergreen broad-leaved forest at an elevation between 1500 and 1600 m in a limestone area (Fig. 1: A). The forest was dominated by *Quercus engleriana* Seem., *Lithocarpus kontumensis* A. Camus, *Castanopsis platyacantha* Rehd. & Wils., *Cinnamomum pingbienense* H. W. Li and *Manglietia grandis* Hu & W. C. Cheng. The understory was dominated by *Miliusa balansae* Finet & Gagnep., *Uvaria tonkinensis* Finet & Gagnep., *Ficus trivia* Corner, *Ilex micrococca* Maxim. f. and *Euonymus rehderianus* Loesen. Some orchids were found growing abundantly in the forest. They were *Dendrobium moniliforme* (L.) Sw., *Cymbidium aloifolium* (L.) Sw., *Eria coronaria* (Lindl.) Rchb.f., *Liparis assamica* King & Pantl., *Bulbophyllum retusiusculum* Rchb. f., *Cheirostylis chinensis* Rolfe and *Cypripedium lentiginosum* P. J. Cribb & S. C. Chen.

In Malipo, the average yearly temperature is 17.6 ℃, and the average temperature in the coldest month and the hottest month is 10.1 ℃ and 23 ℃ respectively. The dry season begins in December and lasts until March of the next year. The wet season ranges from April to November, and the habitats are covered by heavy fog in early morning and evening during this period. The major soil type is limestone, and the soil is rather shallow. The vegetation in the area consists of broad-leaved forests, narrow-leaved forests, shrubbery and hassock; forest community types include montane humid broad-leaved forests and narrow-leaved forests (Liu et al., 2008).

3 Discussion

In Orchidaceae only a few groups, such as the subtribes Limodorinae, Galeolinae, Vanillinae, Lecanorchidinae and Pogoniinae, have two granular (not sectile) pollinia, and one, *Collabiinae*, has two waxy pollinia, and lacks viscidium. The former five are considered to be rather primitive groups (Dressler, 1993).

The narrow-pyriform pollinia in *Ypsilorchis* are two in number. They are not typically waxy nor granular in texture. Each pollinium has a true, even if not typical, caudicle, which is somewhat elastic but slightly spongy. Although its end becomes deeper in color and thicker in texture, it is not a true viscidium. This type of pollinaria, to our knowledge, has not been found in any other group of orchids. Both pollinarium structure and floral morphology, as well as its vegetative characters, show little relationship to the subtribes mentioned above.

Finet (1908) placed this entity in *Liparis* probably based on the similarity in habit and floral morphology between it and some species of *Liparis*, such as *L. assamica* King & Pantl. and *L. resupinata* Ridl. His treatment has been followed by many succeeding botanists. However, the pollinia in *Liparis* and its allies are four in number, which are waxy in texture and lack a true caudicle. *Liparis* and other five genera: *Hippeophyllum* Schltr., *Malaxis* Soland. ex Sw., *Oberonia* Lindl., *Orestias* Ridley and *Risleya* King & Pantl. were treated by Dressler (1993) as belonging to the tribe Malaxideae. However, Chen (1999a) recognized two subtribes: Liparidinae, composed of *Liparis, Malaxis, Oberonia* and *Hippeophyllum,* and *Risleyinae,* including only *Risleya,* but did not mention the tribe Malaxideae. According to Chen's opinion, it is rather easy to group allied genera into a subtribe, but to recognize a tribe needs wider and

deeper studies. *Ypsilorchis* seems to be more related to *Liparis* than to any other orchid genus, even though the relation between them is rather distant based on their pollinarium structure. On this basis, a new subtribe is proposed here. Of course, it is still an open question that whether it is an independent tribe or belongs to the tribe Malaxideae together with the subtribe Liparidinae.

It is interesting that this entity is discontinuously distributed in Chengkou of North Chongqing and Malipo of Southeast Yunnan. The two localities are nearly 1000 km apart (Fig. 3). As we know, there is another epiphytic orchid, *Gastrochilus fargesii* (Kraenzl.) Schltr., that has such a pattern of discontinuous distribution. However, more orchids found both in Chengkou and Malipo are of wide distribution in the subtropical regions of China, including Sichuan, Hubei, Hunan, Guangxi, Guizhou, Yunnan or even Jiangxi, Zhejiang, Taiwan and Xizang. Examples are *Dendrobium hancockii* Rolfe, *Epigeneium fargesii* (Finet) Gagnep., *Calanthe mannii* Hook. f. and *C. davidii* Franch.

Ypsilorchis fissipetala is a small epiphytic plant, and very easy to grow in garden. It is probably also widely distributed in the subtropical regions of China, but we fail to collect it. As a new genus, its special pollinaria, Y-shaped petals, strongly crisped-margined leaves and other features interest us greatly. How does it adapt to ecological environment and to insect pollination? What is the significance of its vegetative and floral structure? These will be the next target of our study.

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兰科一新属和新亚族——丫瓣兰属和丫瓣兰亚族

[1,3,4]刘仲健* [2,1,4]陈心启 [1,4]陈利君

[1](全国兰科植物种质资源保护中心 深圳 518114)

[2](中国科学院植物研究所系统与进化植物学国家重点实验室 北京 100093)

[3](华南农业大学林学院 广州 510642)

[4](深圳市兰科植物保护研究中心 深圳 518114)

摘要 基于丫瓣兰*Ypsilorchis fissipetala* (Finet) Z. J. Liu, S. C. Chen & L. J. Chen(基名为裂瓣羊耳蒜*Liparis fissipetala* Finet)建立了兰科新属——丫瓣兰属*Ypsilorchis* Z. J. Liu, S. C. Chen & L. J. Chen。新属与羊耳蒜属*Liparis*的区别点为: 新属有两个粉蜡质花粉团; 每个花粉团具1个多少有弹性的花粉团柄; 花瓣二深裂; 叶具强烈波状的边缘, 其先端有一个长达1 mm的芒尖。这些特征表明了其与羊耳蒜亚族Liparidinae有明显的差别, 为此, 建立了一个新的亚族——丫瓣兰亚族Ypsilorchidinae Z. J. Liu, S. C. Chen & L. J. Chen。

关键词 新组合; 新属; 新亚族; 兰科; 分类; 丫瓣兰亚族; 丫瓣兰属; 丫瓣兰